

ville (no date given); elsewhere the snowfalls reported were less than one inch. The following is a record, by dates, of the occurrence of snow in the several states and territories: 12th: Saint Vincent, Minn., trace. 14th: Cheyenne, Wyo., 0.7, and Fort Laramie, Wyo., trace. 17th: Lansing, Mich., trace. 19th: Mount Washington, N. H., 4.6; Philipsburgh, Pa., trace; Mount Killington, Vt., trace. 20th: Mount Washington, N. H., 1.3. 21st: Mount Washington, N. H., 1.5; Mount Killington, Vt., trace; Blue Knob, Pa., 0.5; Virginia City, Mont., trace; Wausau, Wis., trace. 22d: Mount Washington, N. H., 0.5; Virginia City, Mont., trace. 23d: Colorado Springs, Colo., 0.1; Denver, Colo., trace; Coulter, Colo., 0.5. (14th and 23d); Cresco, Iowa, trace; Virginia City, Mont., trace; Folsom, Tex., 3.00. 23d-24th: Palmer Lake, Colo., 4.0; Taylor's Ranch, Utah, trace. 24th: La Veta, Colo., 9.1; Fort Logan, Mont., 0.5; Santa Fé, N. Mex., trace; Fort Washakie, Wyo., trace. 25th: Hayward, Wis., trace. 26th: Marquette, Mich., trace; Grand Meadow, Sheldon, and Saint Paul, Minn., trace; Viroqua, La Cross, and Grantsburgh, Wis., trace. 27th: Mount Washington, N. H., 0.5; Mount Killington, Vt., 0.5; Sault de Ste.

Marie, Mich., trace. 28th: Mount Killington, Vt., trace. 29th: Mount Washington, N. H., 0.8; Constableville and Number Four, N. Y., trace. 30th: Mount Washington, N. H., 0.2.

The only report of unmelted snow on the ground at the end of the month was trace, at Mount Washington, N. H.

HAIL.

The more severe hail-storms of the month are noted under "Local storms." Hail was reported during the month as follows: 1st, Pa. 2d, Ariz. 3d, Mo. 4th, Dak. Wis. 6th, Ariz. 7th, Ariz., Kans. 9th, 11th, 12th, Dak. 14th, Colo. 15th, Dak., Ind., N. J., Utah. 16th, N. Y. 17th, Mich. 18th, Ariz., Dak., Ohio. 19th, N. Y., Pa. 20th, Ariz., Colo. 21st, Conn., Kans., Nebr., Pa., R. I. 22d, Dak. 23d, Utah, Wis. 24th, Kans., Pa. 25th, Ariz., Mich. 26th, Iowa, Mich., Minn. 27th, Mich., N. H., N. Y., Vt. 28th, Me., N. J., N. Y., Vt. 30th, Mich., N. J.

SLEET.

Sleet was reported as follows: 12th, Dak. 13th, Mont. 14th, Cal. 21st, Pa. 24th, Dak. 26th, Minn.

WINDS.

The prevailing winds during September, 1889 are shown on chart ii by arrows flying with the wind. In New England, and over the southern plateau region, south to west winds were most frequently noted, except on the south New England coast, where they were from north to east; in the middle and south Atlantic states, the east and west Gulf states, the Ohio valley and Tennessee, the upper Mississippi valley, the middle eastern slope of the Rocky Mountains, and on the north Pacific coast the winds were variable, except along the middle Atlantic coast, north to east; in North Carolina, northerly; along the west Gulf coast, southeast; in Tennessee, northeast to northwest; and in Illinois and Missouri, southeast to southwest; over the Florida Peninsula, northeast to east; in the Rio Grande valley southeast; in the lake regions, southeast to southwest; in the extreme Northwest, north to west; in the Missouri valley and the northeastern slope of the Rocky Mountains, northwest, except at the more southern stations in the Missouri valley, southerly; on the southeastern slope of the Rocky Mountains, south to southeast; over the northern and middle plateau region, west to southwest; on the middle Pacific coast, northwest to southwest; and on the south Pacific coast, west to northwest.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, were reported as follows: Atlantic City, N. J., 54, ne., 11th; Block Island, R. I., 58, ne., 9th; 60, ne., 11th; 52, ne., 12th; Fort Assiniboine, Mont., 50, nw., 2d; Mount Washington, N. H., 98, nw., 21st; 93, nw., 23d; 92, nw., 24th.

LOCAL STORMS.

Exclusive of the storm along the Atlantic coast from the 8th to 12th, inclusive, descriptions of which are given under "North

Atlantic storms," severe storms were reported in Texas on the 1st, 2d, and 3d; in Dakota, 3d and 4th; in Wisconsin, 4th; in Arizona, 6th and 7th; in Indian Territory, 8th to 12th; in Texas, 10th and 11th; in Kansas and Minnesota, 14th; in Virginia, 16th; in Delaware and Pennsylvania, 16th and 17th; in Maine, 19th; in Florida, 20th to 22d; in Florida and Georgia, 23d; and in New Jersey, 25th. Exclusive of the storm period, 8th to 12th, on the Atlantic coast, severe storms were most frequently reported in Texas and Indian Territory, where they were noted on five dates; in Florida on four dates; in Dakota, Arizona, and Delaware on two dates; and in Wisconsin, Virginia, New Jersey, Kansas, Minnesota, Maine, and Georgia on one date.

WATER-SPOUTS.

Rochester, N. Y., 19th: at about 8 a. m. several water-spouts were reported to have been observed at Ontario Beach, near Charlotte, N. Y. Dark, threatening clouds hung low, while loud peals of thunder and flashes of lightning were observed. From the water rose a mass of mist about forty feet in diameter, from the center of which extended a funnel-shaped column about five feet in diameter at the base, and spreading out to a width of eight or ten feet at the top, where it reached the clouds, seemingly about one hundred feet above the surface of the lake. There was an off-shore breeze at the time, and the column moved rapidly in a southeasterly direction. Soon another similar column rose in the west, and the first one diminished in size and disappeared. In the meantime a third one appeared, the second one growing larger, and a fourth appeared between the others. The spouts were visible about twenty minutes, and when departing, seemed to break in the center, the upper part disappearing in the clouds.—*Rochester, N. Y., Union, September 19.*

INLAND NAVIGATION.

HIGH TIDES.

Exclusive of the high tides attending the storm off the Atlantic coast from the 8th to the 12th, high tides were reported as follows: Wood's Holl, Mass., 8th; Key West, Fla., 8th, 9th, 10th; New London, Conn., 9th; Cedar Keys, Fla., 23d; Eastport, Me., 27th.

FLOODS.

Dallas, Tex., 11th: reports from the northern, northeastern, and northwestern sections of this state show that the rains

which have fallen in those districts during the past week have caused general damage to crops and property, and delayed traffic by flood. There is scarcely a railroad that is not obstructed by bridges being washed away, and some points have been cut off from outer communication for forty-eight hours. The damage to the cotton crop will be very large.—*Republic, Saint Louis, Mo., September 12.*

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several

stations; the highest and lowest water for September, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, Sept., 1889, (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La.	29.9	30	18.8	4, 10	4.3	14.5
<i>Arkansas River:</i>						
Fort Smith, Ark.	22.0	14	9.0	8	2.2	6.8
Little Rock, Ark.	23.0	17	10.2	1	4.2	6.0
<i>Missouri River:</i>						
Fort Buford, Dak.		7	0.3	1	-1.0	1.3
Omaha, Nebr.	18.0	1, 2	5.8	29, 30	5.1	0.7
Leavenworth, Kans.	20.0	1	7.0	30	4.8	2.2
Kansas City, Mo.	21.0	17	7.7	30	4.5	3.2
<i>Mississippi River:</i>						
Saint Paul, Minn.	14.5	1, 3	3.2	29, 30	1.9	1.3
La Crosse, Wis.	24.0	2	4.4	30	2.4	2.0
Dubuque, Iowa.	16.0	5	3.9	29	2.2	1.7
Davenport, Iowa.	15.0	5, 6, 7	2.3	23 to 30	1.3	1.0
Keokuk, Iowa.	14.0	14, 15	2.0	28	0.5	1.5
Saint Louis, Mo.	32.0	17, 18	8.2	30	5.2	3.0
Cairo, Ill.	40.0	10	14.4	4	7.1	7.3
Memphis, Tenn.	34.0	12, 13	11.0	5	6.1	4.9
Vicksburg, Miss.	41.0	18	11.7	10	6.8	4.9
New Orleans, La.	13.0	19	5.7	11, 12, 13, 27	3.7	2.0
<i>Ohio River:</i>						
Pittsburgh, Pa.	22.0	19, 24	6.5	2	0.2	6.3

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Ohio River—Cont'd.</i>						
Parkersburg, W. Va.	38.0	24	4.4	8	1.7	2.7
Cincinnati, Ohio.	50.0	30	13.0	13	5.3	7.7
Louisville, Ky.	25.0	30	5.8	15, 16	3.6	2.2
<i>Cumberland River:</i>						
Nashville, Tenn.	40.0	11	13.0	1	3.0	10.0
<i>Tennessee River:</i>						
Chattanooga, Tenn.	33.0	19	8.0	17	2.4	5.6
<i>Monongahela River:</i>						
Pittsburgh, Pa.	29.0	19, 24	6.5	2	0.2	6.3
<i>Savannah River:</i>						
Augusta, Ga.	32.0	25	19.3	17, 18, 19	6.8	12.5
<i>Willamette River:</i>						
Portland, Oregon.	15.0	10	3.9	19	0.2	3.7

Mississippi River.—Saint Paul, Minn.: the steamer "Sidney" left this port for Saint Louis on the 26th. The water in the river is very low, and this is considered the last boat of the season.—*Report of P. F. Lyons, observer, Signal Corps.* Dubuque, Iowa., 29th: the water in the river is so low above this city that navigation will have to be suspended for the season.—*Report of S. C. Emery, observer, Signal Corps.*

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were observed during the month as follows: 3d, Blue Knob, Pa. 4th, Davenport, Iowa. 5th, Lyons, N. Y. 8th, Mount Washington, N. H. 10th, Webster, Dak. 18th, Leech Lake, Dak.; Saint Vincent, Minn. 21st, Carson, Iowa; Bernier Springs, Mich. 22d, Eastport, Me.; Lyons, N. Y.; Clarksburgh, W. Va. 23d, Nashua, N. H. 25th, Webster, Dak.; Manitowoc, Wis. 27th and 28th, Webster, Dak.

Mount Washington, N. H., 8th: the cloudy condition of the sky lifted at 9 p. m., disclosing an auroral arch, having altitude 18°, and azimuth about 75°. The aurora consisted of a band of greenish light about 2° in width, resting on a dark segment, which in turn rested on the horizon. The display ended 11.10 p. m.—*Report of J. W. Bauer, observer, Signal Corps.*

Saint Vincent, Minn.: an auroral arch was observed from 11 p. m. 18th to 5.20 a. m. the following day. The arch rose to altitude 10°, and extended from azimuth 135° to 215°. Its maximum brilliancy occurred at midnight.—*Report of R. J. Boylan, observer, Signal Corps.*

Eastport, Me., 22d: an auroral arch which rose to altitude 15°, and extended from north-northeast to north-northwest, was observed from 9.10 p. m. to 10.30 p. m.—*Report of D. C. Murphy, observer, Signal Corps.*

THUNDER-STORMS.

The more severe thunder-storms of the month are described under "Local storms." Thunder-storms were reported in the greatest number of states and territories, twenty-one, on the 3d, 4th, and 15th; in twenty on the 2d; in from fifteen to eighteen, inclusive, on the 1st, 5th, 14th, and 16th; in from ten to fourteen, inclusive, on 6th to 13th, 17th, 18th, 19th, 21st, to 25th; in seven on the 20th; and in from two to four, inclusive, on the 26th, 28th, 29th, and 30th. The 27th was the only date on which no thunder-storm was reported.

Thunder-storms were reported on the greatest number of dates, twenty-three, in Florida; on twenty-one in Texas; on nineteen in Dakota; on eighteen in Louisiana; on seventeen in Kansas; on from ten to fifteen, inclusive, in Arizona, Arkansas, Georgia, Illinois, Indian Territory, Iowa, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New York, Pennsylvania, and Tennessee; on from five to eight, inclusive, in Alabama, Indiana, Maryland, Massachusetts, New Jersey, North Carolina, Ohio, Virginia, and Wisconsin; on from one to four, inclusive, in California, Colorado, Connecticut, District of Columbia, Kentucky, Maine, Montana, Nevada, New Hampshire, New Mexico, Oregon, Rhode Island, South Carolina, Utah, Vermont, Washington Territory, and Wyoming. No thunder-storms were reported in Delaware, Idaho, and West Virginia.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Dubuque, Iowa: the rain storm on the afternoon of the 4th broke the drought which has prevailed in this section since July.—*Report of S. C. Emery, observer, Signal Corps.*

Fort Sully, Dak., 9th: the corn crop in this section is completely parched by the continued dry weather.—*Report of S. G. Gardiner, observer, Signal Corps.*

Vanceborough, Me., 9th: the eastern part of this state is now passing through one of the most severe droughts known for years. The brooks have entirely run dry, while the lakes and rivers have become low. Forests and vegetation are parched and dry.—*Portland, Me., Press, September 10.*

Montgomery, Ala., 17th: the weather for some days has

been very dry and hot. Through the country there is considerable complaint on account of the scarcity of water. The mills operated by steam and water power are unable to make full time for lack of water. The drought seems to be particularly severe in the country along the Western Railroad, as the passenger trains on the road have been delayed quite frequently, of late, because of the shortage in the water supply.—*The Daily Advertiser, Montgomery, Ala., September 17.*

Thornville, Mich., 30th: the drought which prevailed during the month of August has continued throughout this month. There has been some rain but not enough to make fall pasturage. Wells have failed more than in any previous year.—*Report of Mr. John S. Caulkins, voluntary observer.*